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SCIENCE & LIFE

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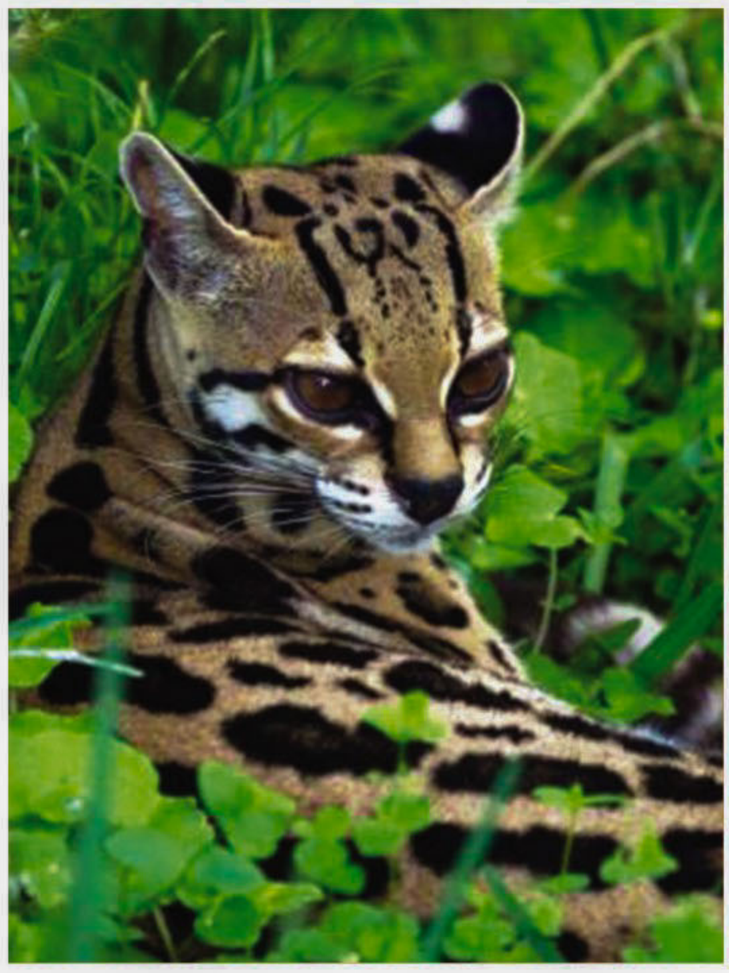
Cat that mimics its prey

OBAIDUR RAHMAN

ANY natural forestry is a place of absolute wonder. Not only from aesthetical point of view but also it is full of surprises and houses a vast array of mammal splendors. And when it comes to a magnificent natural setting like that of the great Amazon, one can surely expect nothing less of extraordinary. In a fascinating turn of events, scientists from the Wildlife Conservation Society (WCS) and Federal University of Amazonas (UFAM) have documented a wild cat species, disguising its own voice, imitating the call of its intended victim. This astonishing behavior was recorded in the Amazonian forests of the Reserva Florestal Adolpho Ducke in Brazil and the wild cat concerned here was a Margay, a solitary and nocturnal spotted cat native to Central and South America. It's intended prey, a small, squirrel-sized monkey known as pied tamarin. It is important to note that, this is the first recorded instance of wild cat species in the Americas mimicking the calls of its prey. This discovery is quite remarkable in the sense that this particular observation by the scientists have confirmed the scientific community what, up until now had been only sketchy reports from Amazonian tribesmen of wild cat species like jaguars and pumas, actually mimicking primates, rodents, agoutis and other species in order to draw them within the striking range. The findings were published in the June issue of Neotropical Primates. According to Fabio Rohe of the Wildlife Conservation Society (WCS) who is also one of the authors of the paper, "Cats are known for their physical agility, but this vocal manipulation of prey species indicates a psychological cunning which merits further study".

A wild cat (specifically a margay) imitating a prey species in order to bring it within striking range

It all started back in 2005 when a group of researchers observed a margay emitting calls similar to those made by tamarin babies. And this particularly attracted the attention of a tamarin "sentinel", which climbed down from the tree to investigate the sounds coming from a tangle of vines called lianas. Noticing the familiar yet strange nature of the calls, the sentinel monkey immediately started vocalizing to warn the rest of the group. The researchers quickly noticed that the monkeys were clearly confounded by these familiar vocalizations yet some (4 other tamarins) choose to investigate the matter rather than flee. This was followed by the most fundamental law of the nature, survival of the fittest. Sensing the possibility to dine, the margay emerged from the foliage walking down the trunk of a tree in a squirrel-like fashion, jumping down and then moving towards the monkeys. Realizing the nature of deception, the sentinel screamed an alarm and joined the other tamarins in fleeing. Even though this particular attempt of the margay was unsuccessful however the researchers were absolutely amazed at the ingenuity of the hunting strategy of the wild cat. The significance of this event was perhaps be best understood by the statement of Dr. Avecita Chicchon, director of the Wildlife Conservation Society's Latin America Program. According to her, "This observation further proves the reliability of information obtained from Amazonian inhabitants. This means that the accounts of jaguars and pumas using the same vocal mimicry to attract prey-but not yet recorded by scientists-also deserve investigation". Currently WCS is monitoring populations of pied tamarin which is listed as "Endangered" on IUCN's Red List whereas margay itself is listed as "Near Threatened". WCS firmly plans to protect both the species, and there is certainly no mimicry about it.



Margays mimic the calls of their prey, tamarin monkeys to fool the primates

The contributor is a freelance science writer.

ACT OF DISCOVERY

Discovery mode of mind

The following makes the 8th and last instalment of Dr. M Ali Asgar's original article titled "Establishment of an Interactive science discovery centre in Asia-Pacific region."

JUST as most efficient transfer of momentum takes place between objects of identical masses, the most efficient interaction in the field of scientific creativity is likely to happen between countries that have more or less similar footings in scientific background, cultural heritage and economic development. For interaction, special closeness of course is another important factor, the countries of Asia pacific nicely satisfy their criteria to make the idea of establishing an interactive science discovery centre. We believe that human mind can interact much better in the field of science, specially, in the discovery mode than when they are fighting in the mode of hatred and suspicion with each other.

The way the science discovery centre can be made to work

The important component of a discovery centre is the community of scientists who must be motivated, inspired, creative people having the creative judgment and self control to tap natural resources and to interact in a co-operative way. Since the process of discovery is not guided by predetermined set of rules, the administration of a discovery centre must also be guided by a creative, non authoritative and way with horizontal control rather than vertical control. The basis of control being information rahter than authoritarian power.

The co-operation may result from the necessity of employing such amount of natural resources and numbers or research workers that these are beyond the capabilities of any country. The threshold of efficiency must be reached through the choice of problem and supply of resources from the participating countries. Those fields of research should get priorities which are not limited by national horizons such as oceanography, meteorology, environment and also basic science. Only the discovery aspects should be given priority rather than the conventional aspects of scientific information. Discovery centre as an open ended and dynamic system can be guided by the scientific approach to decision making.

ConclUded

The author is President Bangladesh Physical

REAL STARS

Brain cells that help us breathe

STAR-SHAPE brain cells previously thought to take a back seat in terms of the brain's activity might play a key role in controlling breathing, a new study in rats suggests.

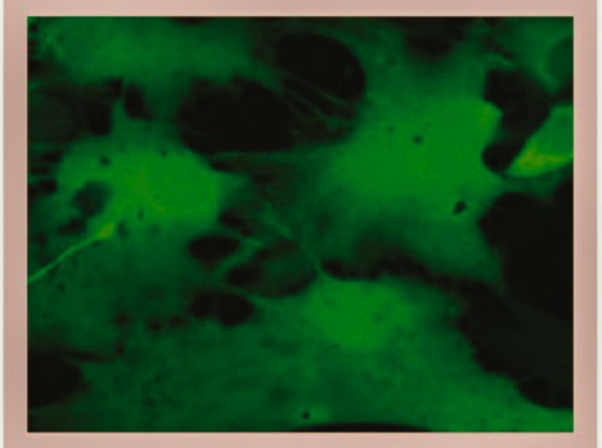
When we breathe, we take in vital oxygen and expel waste carbon dioxide. The study results show brain cells known as astrocytes can sense changes in blood carbon dioxide levels and then signal other brain networks to adjust breathing.

"This research identifies brain astrocytes as previously unrecognized crucial elements of the brain circuits controlling fundamental bodily functions vital for life, such as breathing, and indicates that they are indeed the real stars of the brain," said study researcher Alexander Gourine of University College London.

It's possible that these brain cells or others like them contribute to disorders associated with respiratory failure such as Sudden Infant Death Syndrome (SIDS). However, more research is needed to prove the links, the researchers say. Also, while rats are considered a good model for studies on the human brain, future research is needed to make sure the results hold true for humans as well.

The study will be published this week in an early online edition of the journal Science.

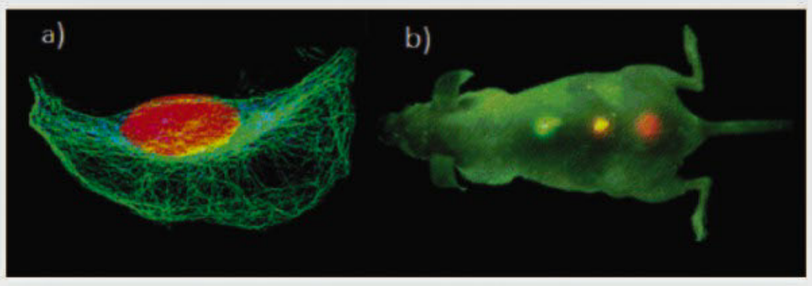
Source: LiveScience



Star-shape brain cells called astrocytes might play a key role in controlling breathing

QUANTUM DOT

Nanoelectronic gemstone



A) Cells using quantum dots fluorescence. b) Multicolor quantum dot probes injected into a mouse can detect and track multiple tumor targets

IMRAN HOSAIN

DIAMONDS, gemstones have always amazed us with their colors. Now in the era of nanotechnology, it's the Quantum Dot (QD) that is dazzling our eyes. QDs are semiconductor nanostructures, 25 billionths of a meter in diameter, which can confine electrons in three dimensions and emit light when exposed to ultraviolet radiation or X-ray. About 50 thousandth the width of a human hair, these nano-scale gems are built by confining electrons in some insulating material(s) around a central, well-conducting region. Although they can be composed of hundreds of atoms, quantum dots in many ways behave almost as if they were single gigantic atoms. This enables the study of quantum mechanical effects on a length scale that is around 100-500 times larger than the pure atomic scale.

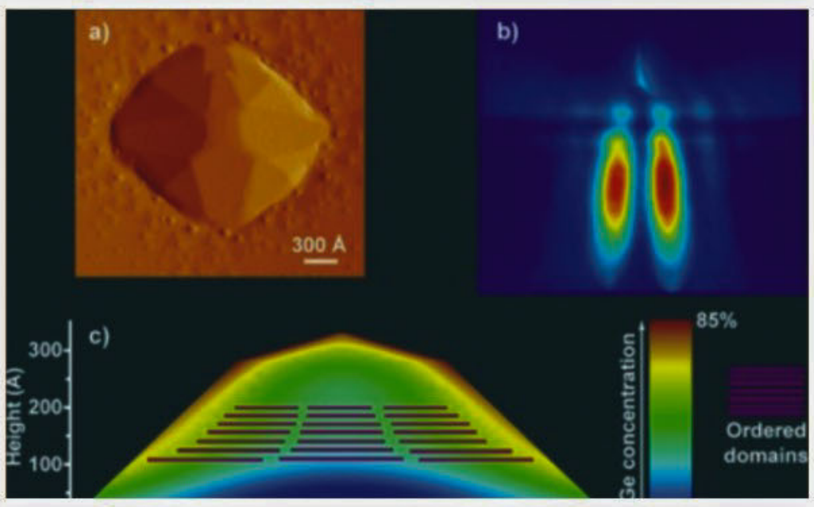
QDs display unique optical and electrical properties that are different from bulk material. Excited QDs emit light, this emission depends not only on the material from which the QD is made, but also on the dot's size. QDs can therefore be "tuned" during production to emit any color of light desired. The smaller the dot, the closer it is to the blue color, and the larger the dot, the closer to the red end of the spectrum. QDs can even be tuned beyond visible light.

These glittering nanostructures are now in action at different technological warfronts. QD lasers can be operated at wavelengths previously not possible using semiconductor laser technology. QD light-emitting diodes can be incorporated into a new generation of applications such as flat-panel TV screens, digital cameras, mobile phones, personal gaming equipments.

QD technology is one of the most promising candidates for use in solid-state quantum computation. With several entangled QDs, quantum bits (qubit) are realizable. QDs as a source of pairs of entangled photons can play a major role in the development of quantum information technologies. QD detectors can be used in medical and environmental sensing, optical communications, thermal imaging, night vision cameras, and missile tracking and recognition. In modern biological analysis, organic dyes are being replaced by QDs. QDs have been tested in most biotechnological applications that use the fluorescence, including DNA recognition, cell animal biology, biological motion tracking.

Research on new generation of 31% to 42% efficient Photovoltaic devices using QDs may be the next big breakthrough in our energy crisis. With so many potentials, QD is a technology for everyone to keep an eye on.

The author is a freelance science enthusiast and student of electrical engineering in BUET.



A) An AFM (Atomic Force Microscope) image of a germanium quantum dot on silicon shows its external shape. b) and c) X-ray scattering techniques reveal its internal structure

COSMIC TIGER WOODS

Beneath that blazing facade

IN the pantheon of cosmic celebrities, the sun is one true superstar. It's not only the Earth's prime source of light and heat it also fuels the greenery that makes breathing possible, keeps time by setting the body's daily rhythms and spits out charged particles that create the beauty of the aurora borealis.

But for all its roles on life's stage, the sun remains something of an inscrutable star. You might say it's the Tiger Woods of the cosmos.

Behind its blazing facade, the sun turns out to be reluctant to give up its secrets. Most frustratingly, astronomers haven't figured out one of the most basic facts about Earth's nearest star: exactly what it's made of.

"We really don't know what the sun's composition is," says Carlos Allende Prieto, an astronomer at the Instituto de Astrofisica de Canarias in the Canary Islands. "It's a big problem."

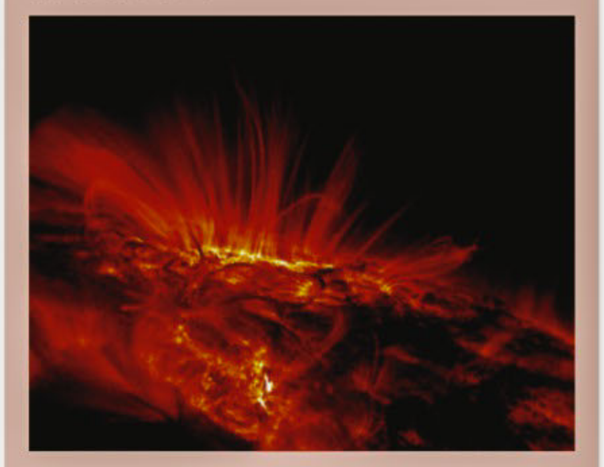
Physicists do know a lot about the sun and how it works: Hydrogen atoms fuse in its core, forging helium and heavier elements and spewing out energy in the process. But over the past several years, scientists have dramatically overhauled estimates of the sun's chemical makeup. In particular, they say there may be far less of key elements such as oxygen, carbon and nitrogen than previously thought. These changes are major enough to throw into question other basic assumptions about the sun, such as ideas about how sound waves travel through its interior, ringing it like a gong.

And because the sun is the yardstick by which many other astronomical phenomena are measured, if scientists change their ideas about solar chemistry, they must also modify their thoughts about the chemical composition of sunlike stars. Those changes, in turn, affect ideas about how galaxies evolve, such as the rate at which stars form over time, synthesizing and ejecting heavier elements out into the universe.

"People always compare stars of the same type to the sun, and now the sun has changed," says astronomer Nicolas Grevesse of the University of Liège in Belgium. "Now we're rechecking everything, restarting all the analyses from A to Z."

Slowly, however, researchers are edging toward an answer. New, more sophisticated computer models have improved understanding of the sun's atmosphere, permitting better estimates of chemical abundances. Deeper discussions of which data to include, and which to leave out, are helping smooth battle lines between research teams arguing over what the final numbers should be. Soon, stories about what Earth's superstar is made of could read more like trusted newspaper copy than celebrity gossip.

Source: Science Live



Scientists are still trying to pin down the abundances of elements that swirl and churn beneath the sun's busy surface

STORM IN THE DEEP

Deep Smoker

Captured by high-resolution cameras aboard a robotic submersible, mineral-rich water spews from hydrothermal vents in this picture of Kawio Barat, a massive undersea volcano off Indonesia.

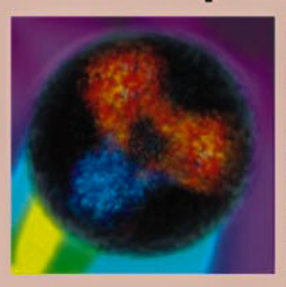
During the past few weeks, the submerged volcanoone of the world's largestwas mapped and explored in detail for the first time by a joint Indonesian-U.S. expedition north of the island of Sulawesi.

Mining companies first spotted the Kawio Barat volcano in the 1990s with satellite altimetry. But "we were the first to go there with a [remotely operated vehicle] and actually discover hydrothermal fluids coming out of the volcano," microbiologist Jim Holden, chief U.S. scientist for the Kawio Barat expedition, said in an email.

Deep Smoker

DO YOU KNOW

What are quarks and gluons?



For close to three decades, nucleons (protons and neutrons) were considered to be the ultimate subatomic particles. As scientists delved deeper, they detected shadows of yet another layer of matter inside nucleons. Unable so far to crack open a nucleon and bring out one of these shadowy objects for observation and measurement, they named them quarks. It is believed that one up and one down quark make up the proton and neutron. Quarks are held together by a force dubbed the chromo force, represented by particles named gluons, which are just as unseen as quarks.